

CLAIMS

What is claimed is:

1. A system for transmitting data, comprising:
 - 5 a server operable to generate user data for use at a client station;
 - a spatial compressor component of the server that is operable to inspect the user data and generate spatially compressed data therefrom;
 - a temporal compressor component of the server that is operable to inspect the user data and generate temporally compressed data therefrom;
 - 10 a client station coupled to the server and structured to receive the spatially compressed data and the temporally compressed data;
 - a decoder component of the client station that is operable to transform the spatially compressed data and the temporally compressed data into a frame portion; and
 - 15 an image generator structured to generate an image from the frame portion and show the image in a form for use by a user of the client station.
2. The system of claim 1 wherein the server and the client station are coupled to one another by a communication link, and wherein the server and the client station communicate to one another over the communication link using a remote desktop communication protocol.
- 20 3. The system of claim 2, further comprising a data server coupled to the server through a second communication link, the server and the data server communicating by using a communication protocol other than the remote desktop communication protocol used by the server and the client station.
4. The system according to claim 3 wherein the data server is a video server.
- 25 5. The system according to claim 1, further comprising one or more additional client stations each of which is coupled to the server and structured to receive the spatially compressed data and the temporally compressed data.

6. The system according to claim 1 wherein the frame portion is a bitmap.

7. The system according to claim 1 wherein the frame portion is one frame of a video.

5 8. The system according to claim 1 wherein the user data comprises data that is for the use of the client station at a first and a second time, and wherein the temporal compressor is structured to perform an XOR operation using data for the use of the client station at the first and the second time as inputs, and produce a difference output.

10 9. The system according to claim 8 wherein the temporal compressor is further structured to perform a run length encoding on the difference output to create an encoded output.

10. The system according to claim 9 wherein the encoded output comprises one or more number pairs, wherein a first number of the number pair indicates the number of zeros in a current run, and wherein a second number of the number pair indicates a symbol following the last zero in the current run.

11. The system according to claim 9, wherein if a last number of a row in the difference output to be run length encoded is a zero, for the last number pair in the encoded output, a first number of the last number pair indicates one less than the number of zeros in a current run.

12. The system according to claim 1 wherein the temporal compressor creates a lossless temporal encoding of the user data.

25 13. The system according to claim 1, further comprising a comparison component of the server that is operable to examine the user data, the spatially compressed data, and the temporally compressed data, and to select any combination therefrom to transmit to the client station.

14. The system according to claim 13 wherein the comparison component is structured to select the smallest combination or sub-combination of the user data, the spatially compressed data, and the temporally compressed data prior to transmitting it to the client station.

5 15. A system for transmitting data, comprising:
a server running an application program for generating multimedia data;
a data compressor structured to accept the multimedia data at an input and produce spatially and temporal compressed multimedia data at an output;
a thin client coupled to the server and structured to receive the spatially and temporally compressed multimedia data; and
10 an image generator structured to generate a multimedia image from the spatially and temporally compressed multimedia data received by the thin client.

16. The system of claim 15 wherein the server and the thin client are coupled to one another by a communication link, and wherein the server and the thin client communicate to one another over the communication link using a remote desktop communication protocol.

17. The system of claim 16, further comprising a data server coupled to the server through a second communication link, the server and the data server communicating by using a communication protocol other than the remote desktop communication protocol used by the server and the thin client.

18. The system according to claim 17 wherein the data server is a video server.

25 19. The system according to claim 15, further comprising one or more additional thin clients each of which is coupled to the server and structured to receive the spatially and temporally compressed multimedia data.

20. The system according to claim 15 wherein the multimedia data comprises data that is for 30 the use of the thin client at a first and a second time, and wherein the data compressor is

structured to perform an XOR operation using data for the use of the thin client at the first and the second time as inputs, and produce a difference output.

21. The system according to claim 20 wherein the data compressor is further structured to

5 perform a run length encoding on the difference output to create an encoded output.

22. The system according to claim 21 wherein the encoded output comprises one or more number pairs, wherein a first number of the number pair indicates the number of zeros in a current run, and wherein a second number of the number pair indicates a symbol following the 10 last zero in the current run.

23. The system according to claim 21, wherein, if a last number of a row in the difference output to be run length encoded is a zero, for the last number pair in the encoded output, a first number of the last number pair indicates one less than the number of zeros in a current run.

24. A method of transferring data in a system including a server coupled to a thin client by a communication link that carries a remote desktop protocol, the method comprising:

on the server:

generating multimedia data;

5 compressing the multimedia data spatially and temporally to make compressed multimedia data; and

transmitting the compressed multimedia data to the thin client;

on the thin client:

receiving the compressed multimedia data from the server;

25 de-compressing the compressed multimedia data into useable data; and
presenting the useable data on the thin client.

25. The method of claim 24, further comprising storing the useable data in a cache on the thin client.

30

26. The method of claim 24 wherein presenting the useable data on the thin client comprises generating an image on a display screen.

27. The method of claim 24 wherein presenting the useable data on the thin client comprises 5 showing a video clip on a display coupled to the thin client.

28. The method of claim 27 wherein showing a video clip comprises showing a series of frames on the display.

10 29. The method of claim 27 wherein generating multimedia data comprises:
establishing a data connection with a video server;
retrieving video data from the video server; and
converting the video data to display data.

15 30. The method of claim 24 wherein a plurality of thin clients are coupled to the server, the method further comprising transmitting the compressed multimedia data to the plurality of the thin clients coupled to the server.

20 31. The method of claim 30 wherein transmitting the compressed multimedia data to the plurality of the thin clients comprises transmitting the compressed multimedia data to the plurality of thin clients simultaneously.

32. The method of claim 24 wherein de-compressing the compressed multimedia data comprises creating bitmaps of data.

25 33. The method of claim 24 wherein compressing the multimedia comprises lossless data compression of the multimedia data.

30 34. The method of claim 24 wherein compressing the multimedia comprises performing an XOR operation on data that is scheduled to be presented on the thin client at different times, the XOR operation creating a difference code.

35. The method of claim 34, further comprising encoding a plurality of difference codes.

36. The method of claim 34, wherein encoding a plurality of difference codes comprises generating one or more number pairs, wherein a first number of the number pair indicates the 5 number of zeros in a current run, and wherein a second number of the number pair indicates a symbol following the last zero in the current run.

37. The method according to claim 34, wherein encoding a plurality of difference codes comprises generating one or more number pairs, wherein if a last number of a row in the 10 difference codes to be run length encoded is zero, for the last number pair in the encoded output, a first number of a last number pair indicates one less than the number of zeros in a current run.

38. The method according to claim 24 wherein compressing the multimedia spatially and temporally comprises:

performing a procedure on the multimedia data intended to compress the multimedia spatially; and
determining if the first procedure created a result smaller than the multimedia data.

39. The method according to claim 24 wherein compressing the multimedia spatially and 20 temporally comprises:

performing a procedure on the multimedia data intended to compress the multimedia temporally; and
determining if the procedure created a result smaller than the multimedia data.